

AD-A182 458

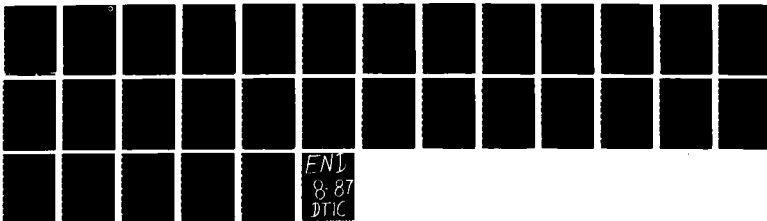
NAVY JOB PERFORMANCE MEASUREMENT PROGRAM: AN
EXAMINATION OF DATA BASES PR (U) NAVY PERSONNEL
RESEARCH AND DEVELOPMENT CENTER SAN DIEGO CA
P J KIDDER ET AL JUN 87 NPRDC-TN-87-28

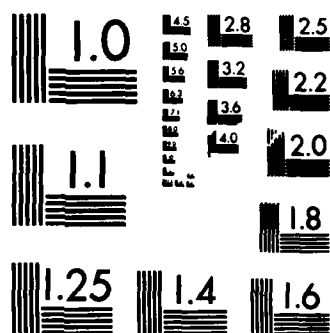
1/1

UNCLASSIFIED

F/G 5/9

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Navy Personnel Research and Development Center

San Diego, CA 92152-6000

TN 87-28

June 1987



[Handwritten signature]

AD-A182 450

DTIC FILE COPY

Navy Job Performance Measurement Program: An Examination of Data Bases, Programs, and Training Simulators as Sources of Job Performance Information

Approved for public release; distribution is unlimited.

DTIC
ELECTE
JUL 15 1987
A



DEPARTMENT OF THE NAVY
NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
SAN DIEGO, CALIFORNIA 92152-6800

3900
62/473
18 JUN 1987

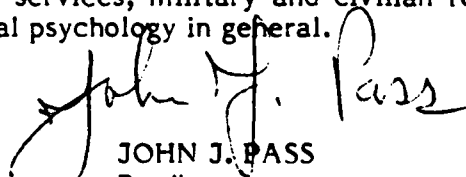
From: Commanding Officer, Navy Personnel Research and Development Center

Subj: **Navy Job Performance Measurement Program: An Examination of Data Bases, Programs, and Training Simulators as Sources of Job Performance Information**

Encl: (1) NPRDC TN 87-28

1. The Navy Job Performance Measurement Program is an outcome of the Navy Performance-Based Personnel Classification Sub-project (Z17701.001.). Both efforts constitute significant contributions to the Joint-Service Job Performance Measurement/Enlistment Standards Project. The Joint-Service Project has been mandated by Congress to link enlistment standards to job performance, which can be considered a landmark research thrust of the armed services. The present research has been funded under 63707N (Manpower Control System Development), Project Number Z1770 (Manpower and Personnel Development), and under reimbursable funding from the Training and Performance Data Center, Training Effectiveness Division.

2. The objective of this effort was to determine the feasibility of using existing data bases, programs, and simulators as sources of job performance information. This information is intended to benefit the research community. Ultimately, the outcome of the project will benefit the armed services, military and civilian research communities, and applied industrial/organizational psychology in general.


JOHN J. PASS
By direction

Distribution:
Chief of Naval Operations (OP-13), (135L)
Defense Technical Information Center (DTIC) (2)



AI

**Navy Job Performance Measurement Program: An Examination
of Data Bases, Programs, and Training Simulators
as Sources of Job Performance Information**

Pamela J. Kidder
Rebecca M. Nerison
Gerald J. Laabs, Ph.D.

Reviewed and released by
John J. Pass, Ph.D.
Director, Personnel Systems Department

Approved for public release;
distribution is unlimited.

Navy Personnel Research and Development Center
San Diego, California 92152-6800

8c ADDRESS (City, State, and ZIP Code)			10 SOURCE OF FUNDING NUMBERS			
			PROGRAM ELEMENT NO 63707N	PROJECT NO Z1770	TASK NO Z1770.01	WORK UNIT ACCESSION NO
11 TITLE (Include Security Classification) Navy Job Performance Measurement Program: An Examination of Data Bases, Programs, and Training Simulators as Sources of Job Performance Information						
12 PERSONAL AUTHOR(S) Kidder, P. J., Nerison, R. M., and Laabs, G. J.						
13a TYPE OF REPORT Interim		13b TIME COVERED FROM 85 TO 86		14 DATE OF REPORT (Year, Month, Day) 1987 June		15 PAGE COUNT 30
16 SUPPLEMENTARY NOTATION						
17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Simulators, data bases, programs, job performance measurement, performance assessment			
FELD	GROUP	SUB-GROUP				
05	09					

SUMMARY

Problem

The armed services, in cooperation with the Department of Defense, have undertaken a joint effort to investigate the feasibility of measuring on-the-job performance and using information from these measures to set military enlistment standards. Before the linkage between performance and enlistment standards can be attempted, comprehensive and economical measures of job performance must be developed and validated.

The Job Performance Measurement (JPM) program is developing hands-on and substitute measures of job performance for selected ratings. Prior to the development of new measures for each rating, it is essential to examine and evaluate existing technology as sources of job performance information.

Objective

The objective of this effort was to determine the feasibility of utilizing existing Navy data bases, programs, and simulators as alternative sources of job performance information.

General Approach

Data were collected by reviewing documentation relating to each system and interviewing cognizant personnel. One data base, five programs, and eight simulators were evaluated. The structure, current use, and possible performance measurement uses were examined for each system.

Conclusions

The examined Navy data bases, programs, and simulators do not obviate the need for a performance testing program, but these systems can support such a program. In selected ratings, existing data bases may eliminate the need for a complete job analysis prior to development of performance measures. Programs may provide items for testing personnel, eliminating the need for time-consuming, costly item development in all situations. Simulators may be used as substitute measures of job performance with modification of software.

Recommendations

The following recommendations are made on the basis of the current effort: (1) Navy Occupational Task Analysis Program (NOTAP) questionnaires can be used to determine the representativeness and criticality of tasks to ratings; (2) Personnel Qualification Standards (PQS) and Propulsion Examination Board (PEB) items should be examined and adopted whenever appropriate; (3) extant sources of technical information, such as the Engineering Operational Sequencing System (EOSS), should be used; (4) the Electronic Equipment Maintenance Trainer (EEMT) should be used as a high-fidelity substitute measure of hands-on performance; (5) two training simulators that contain actual equipment (i.e., the Practical Application Laboratory and the Navy Tactical Data System) should be used to collect hands-on performance data; and (6) analyses of additional data bases, programs, and simulators should be conducted to form a broad network of job performance information for use by many groups.

CONTENTS

	Page
INTRODUCTION	1
Problem	1
Objective	1
Background	1
APPROACH	2
DATA BASE	2
Background	2
Importance to the JPM Project	2
Format of the Data Base Examination and Evaluation	2
Navy Occupational Task Analysis Program (NOTAP)	3
Information Description	3
Availability	4
General Remarks	4
PROGRAMS	4
Background	4
Importance to the JPM Project	5
Format of the Program Examination and Evaluation	5
Personnel Qualifications Systems (PQS)	6
Information Description	6
Availability	7
General Remarks	8
Fleet Feedback System (FFS)	9
Information Description	9
Availability	10
General Remarks	10
Personnel and Training Education Program (PTEP)	10
Information Description	10
Availability	11
General Remarks	11
Propulsion Examination Board (PEB)	12
Information Description	12
Availability	13
General Remarks	13
TRAINING SIMULATORS	14
Background	14
Importance to the JPM Project	14
Format of Training Simulator Examination and Evaluation	14
AC Two Speed Motor Controller Trainer (11E15)	15
Hardware and Software	15
Output	15
Fidelity	15

Current Usage	16
Additional Uses	16
Automated Communications Emulator (ACE)	16
Hardware and Software	16
Output	16
Fidelity	16
Current Usage	16
Additional Uses	17
Close in Weapons System Trainer (11G2)	17
Hardware and Software	17
Output	17
Fidelity	17
Current Usage	17
Additional Uses	17
Cutler-Hammer Logic Controller Elevator Trainer	18
Hardware and Software	18
Output	18
Fidelity	18
Current Usage	18
Additional Uses	18
Electronic Equipment Maintenance Trainer (EEMT)	18
Hardware and Software	19
Output	19
Fidelity	19
Current Usage	19
Additional Uses	19
Navy Tactical Data System Laboratory (NTDS)	19
Hardware and Software	19
Output	20
Fidelity	20
Current Usage	20
Additional Uses	20
Practical Applications Laboratory (PRAC DECK)	20
Hardware and Software	20
Output	21
Fidelity	21
Current Usage	21
Additional Uses	21
Small Craft Electrical System Trainer (11E18)	21
Hardware and Software	22
Output	22
Fidelity	22
Current Usage	22
Additional Uses	22
RECOMMENDATIONS	22
Data Bases	22
Programs	23
Simulators	23
CONCLUSIONS	24
REFERENCES	25

INTRODUCTION

Problem

The Navy has been assigned the task of developing reliable and valid measures of job performance (Laabs & Berry, in press). The Job Performance Measurement (JPM) program has been created to carry out this task. The JPM program is developing hands-on job performance tests and substitute measures of job performance for selected ratings. Ratings were selected based on criticality to the Navy's mission and population size. The ratings include: (1) machinist's mate (MM), (2) radioman (RM), (3) electronics technician (ET), (4) operations specialist (OS), (5) fire control technician (FC), and (6) electrician's mate (EM). Prior to developing measures for each of the selected ratings, an effort was completed to determine the existing sources of Navy performance data.

The current work examines alternative sources of job performance information. The Navy currently uses data bases, programs, and simulators for a variety of purposes. Each of these systems contains a great deal of information. In order to avoid duplication of effort and to use Navy resources to their fullest, several systems have been examined and evaluated. This allows for the most cost effective use of time and money.

The following discussions of data bases and programs contain information that is applicable to many ratings. The section on training simulators contains information that is pertinent to the JPM program's selected ratings. That is, simulators that are currently used by the six selected ratings were examined.

Although the initial review of materials was performed for use by the JPM program, the information obtained may be used by any group developing training programs, job performance criteria, or selection predictors.

Objective

The objective is to identify, describe, and provide an initial evaluation of alternative sources of job performance information, including Navy data bases, programs, and simulators.

Background

The Armed Services, in cooperation with the Department of Defense, have undertaken a joint effort to investigate the feasibility of measuring on-the-job performance and using these measures to set military enlistment standards. Before the linkage between performance and enlistment standards can be attempted, comprehensive and economical measures of job performance must be developed and validated.

The Navy is developing hands-on and substitute measures of job performance. The Navy currently holds a great deal of information that relates to job performance. Prior to developing performance measures, it is essential to evaluate existing technology. This work serves as a first step in the JPM program by identifying, describing, and evaluating existing data bases, programs, and simulators that have potential for use in performance measurement.

APPROACH

The approach to this effort included:

1. Identification of potential sources through interviews with Navy management personnel and a perusal of the Navy Directives checklist (5200).
2. Assembling available documentation for each potential source.
3. Conducting interviews with cognizant personnel where necessary to augment the printed information.
4. Evaluating the existing sources for their potential to provide job performance information or otherwise to support the Navy JPM program.

DATA BASE

Background

The need for a comprehensive Navy occupational information system has been recognized. The goal of such a system is to provide a proficient occupant for every billet in the Fleet. The foundation of such a system would be an occupational data base containing the identification of jobs, duties, skills, and tasks for each rating. The primary occupational data base currently available for this purpose is the Navy Occupational Task Analysis Program (NOTAP). NOTAP data are used as the basis of occupational standards (OCCSTDs) and Navy Enlisted Classifications (NECs). OCCSTDs define the enlisted tasks required of, and within, specified occupational entities (rates and ratings). They are minimum standards which represent the lowest level of responsibility to fulfill Navy needs. NECs identify skills requiring more specific identification than is provided by rates and ratings and are not rating-wide requirements (Department of the Navy, 1975).

Importance to the JPM Project

Occupational data bases ideally provide detailed, comprehensive information regarding Navy occupations. OCCSTDs, training materials and curricula, and other personnel functions all require specific job task data that can be used in the preparation of job performance evaluation and job training programs. The data base of NOTAP is examined for its potential usefulness in the performance measurement area.

Format of the Data Base Examination and Evaluation

The data base examined in this report is that associated with NOTAP. The following format was used.

1. Information Description
 - a. Type of Information
 - b. Data Elements
 - c. Source of Information
 - d. Currency and Maintenance

2. Availability
 - a. Normal Usage
 - b. Access Procedures
3. General Remarks

Section 1, Information Description, provides an overview of the data base. The nature of the information (a), for example, task inventory, is described first. Individual elements comprising the system (b), are then described. Source of information (c) refers to the manner in which the information was obtained and what resources were used. Currency and maintenance (d) discusses the currency and upkeep of the information kept in the data base.

Section 2, Availability, discusses (a) how the data base is being used currently and (b) how the information can be accessed. General Remarks, Section 3, includes advantages, limitations, and a short evaluation of the data base's potential for providing job performance information to the JPM project.

Navy Occupational Task Analysis Program (NOTAP)

Information Description

The Navy Occupational Development and Analysis Center (NODAC), a detachment of the Naval Military Personnel Command (NMPC-5), is the primary source of job information on enlisted ratings for the Navy. The NOTAP is a program conducted by NODAC which surveys the work performed by personnel in each Navy rating.¹

Type of Information. NODAC designs and administers task inventories that contain detailed task statements. An inventory typically contains several hundred task statements for Navy enlisted jobs (Robertson, 1984). Other sections of the inventory contain items on watchstanding and collateral duties, tools and equipment, and types of ships or aircraft. A task inventory is developed for each rating or occupational area surveyed by NOTAP.

The inventory is a composite of the tasks and supporting background material applicable to the survey population and is assembled from on-site observations, interviews, review of publications and directives, and assistance of subject matter experts (SMEs). Inventory development comprises the following:

1. A tentative task list is developed. Sources of information include current inventories, jury of experts, and developers of new hardware and systems.
2. The task list is authenticated by rating advisors, warfare sponsors, enlisted community managers, training commands, a group of SMEs, and job incumbents.
3. Job incumbents verify the performance of the tasks on the list and may also provide descriptive characteristics of the tasks.

¹The Navy Enlisted Professional Development Information System (NEPDIS) was examined as a potential source of job performance information. This experimental program was designed to be a fully computerized information assembly and analysis system that would support manpower, personnel, and training management (Ansbro, 1982). NEPDIS has not progressed beyond experimental status and is not currently in use; therefore, it has not been included in this report.

Data Elements. Data collected include:

1. Conditions under which the tasks are performed.
2. Cues that initiate and guide performance of the task.
3. Standards which represent adequate task performance.
4. Task elements (those parts of the task necessary to its performance but are not performed as an end in themselves).

Job task data are analyzed to provide frequency distributions of the tasks for a profile of job activities unique to the rating, to each paygrade, and, as needed, to particular types of ships, submarines, or aircraft. These frequency distributions provide a principal source of data for the development of OCCSTDs and course curricula. NOTAP data² include all ratings at paygrades E-4 through E-9.

Currency and Maintenance. About 16 ratings are surveyed each year.³ High-technology ratings, such as ETs, are updated every 3 years. Low technology ratings, such as storekeeper, are surveyed every 6 years. NODAC is responsible for maintaining the occupational data bank for the Chief of Naval Personnel.

Availability

Normal Usage. NOTAP data are used to develop and validate OCCSTDs, training materials and curricula, and, along with data from other programs, help to validate Navy billet requirements.

Access Procedures. NOTAP data may be obtained from the Officer in Charge, NODAC.

General Remarks

NOTAP data are useful for obtaining a comprehensive picture of an occupation. SMEs are needed to add more specific information concerning individual tasks and to determine on which tasks a performance test should focus.

PROGRAMS

Background

Various Navy programs have been developed over the years to meet the growing demands of training school curricula, on-the-job training, and performance evaluation. They take on various forms ranging from very focused and training-specific guidance programs to extremely broad and subjective evaluation programs.

^{2,3} D. Shotts, personal communication, August 13, 1986.

Each program plays a different role in the overall functioning of the Navy personnel system, and the scope varies from structuring training to evaluating performance. For example, specific performance evaluation of the boiler technician (BT) and MM ratings is accomplished by the Propulsion Examining Board (PEB). In contrast, the Fleet Feedback System (FFS) evaluates training school effectiveness for all technical ratings. Each program serves a well-defined purpose in ensuring that personnel are qualified to do their jobs.

Importance to the JPM Project

Potential importance of existing programs is twofold: (1) to provide actual data so that new measures will not have to be constructed and (2) to provide instruments for measuring job performance.

There are advantages in reviewing existing programs for usable instruments to supplement those being constructed. First, time is saved. Some of the instruments are already complete. Second, costs are kept down. Needless duplication of effort is costly in terms of personnel and resources. Third, procedures that work and do not work are already known in many cases. Direct use can be made of program elements that have proven valid and reliable.

Format of the Program Examination and Evaluation

Four programs are described herein:

1. Personnel Qualification Standards (PQS).
2. Fleet Feedback System (FFS).
3. Personnel and Training Evaluation Program (PTEP).
4. Propulsion Examination Board (PEB).

The Program Evaluation used the following format:

1. Information Description
 - a. Type of Information
 - b. Data Elements
 - c. Source of Information
 - d. Currency and Maintenance
2. Availability
 - a. Normal Usage
 - b. Access Procedures
3. General Remarks

Section 1 contains a description of the information comprising each program and its primary purposes. Type of Information (a), refers to the format each program utilizes in order to carry out its appointed task, for example, oral interview. Data elements (b) describe specific program components, such as sets of questions administered to trainees.

Source of Information (c) describes how the material was derived and where it was developed. Currency and Maintenance (d) contains information regarding how the program is kept up to date with changing technology and requirements.

Section 2 describes (a) how and by whom the program is currently being used and (b) how the information can be accessed. Section 3, General Remarks, contains a brief assessment of advantages, limitations, and potential uses of the program for use in the JPM project.

Personnel Qualifications System (PQS)

Information Description

The PQS is a system designed to standardize and formalize enlisted on-the-job training. The PQS is a training guide that provides the minimum knowledge and skill requirements a person must have in order to qualify for a particular job or watchstation.⁴

Type of Information. The PQS is divided into three sections. Section 100 (fundamentals) contains the fundamental knowledge or "book learning" necessary for satisfactory understanding of the watchstation duties. Section 200 (systems) is designed to acquaint the watchstander with the systems he or she will be required to operate at the watchstation. Section 300 (watchstations) lists the tasks required to satisfactorily perform in order to achieve final PQS qualification for a particular watchstation.

The PQS program consists of the standard booklet and the progress chart, or any record (e.g., spread sheet) of final results as determined by the type commander.⁵ Standard booklets are developed that contain knowledge questions and hands-on performance requirements that are specific to a watchstation and associated system and equipment.

Data Elements. The standard booklet contains questions that the trainee must be able to answer and performance items which he or she must be able to do in order to qualify for a particular watchstation or workstation. Answer books containing line-item short answers are available for Section 100 (fundamentals) and Section 200 (systems) for some PQS watchstations.

Source of Information. The requirements set forth in the PQS packages are developed by SMEs who work with the PQS Development Group located at the Naval Training Center (NTC), San Diego, California. The Development Group consists of four departments: operations, aviation, engineering, and weapons. The SMEs, who are current job incumbents, meet for 2-week workshops to produce the PQS. Standards are written to include everything one needs to know in order to perform successfully at a given watchstation.

⁴The Shipboard Propulsion Plant Operator Training (SPPOT) program is a research and development effort that incorporates PQS in order to provide on-the-job training aids for BTs and MMs (Main, Abrams, Chiles, Todd, & Cunanan, 1981). SPPOT development has been terminated and the program is being replaced by the Propulsion Plant Training Manual. Therefore, it has not been included in this report.

⁵J. Weaver, personal communication, August 7, 1986.

Currency and Maintenance. There are approximately 700 PQSs now in use. These are revised about every 3 years.⁶ The PQS procedure is applied primarily on the basis of requests due to Navy training requirements and Fleet requirements. Coverage of both old and new systems, equipment, and tasks may not be, therefore, comprehensive. PQS is not applicable to nuclear propulsion or the Fleet ballistic missile weapons systems. Ratings that have no associated PQS include personnelman, yeoman, and dental technician.

Recent years have seen a shift away from maintenance-oriented programs toward operator-oriented programs. Design of PQS has become more in-depth; sections that were once optional, such as safety precautions unique to a particular system, are now required. The job qualification requirement (JQR) is a locally developed PQS designed specifically for a local need. The new PQS is submitted for approval and can then be used command wide.

A PQS manager's guide has been created to provide guidance for PQS implementation and management. It is designed for use by supervisors and managers who are assigned the responsibility of administering the PQS program, and it assists in overall management, record keeping, and inspection guidelines (Office of Naval Education and Training, 1986).

Availability

Normal Usage. PQSs are written for watchstations, not for equipment or ratings. Any trainee at a given watchstation, regardless of rating, must complete the relevant PQS.

PQS qualifiers are normally E-5 or above and ideally are acknowledged experts in a specified area of qualification. Qualifiers serve a dual role in exercising quality control over the PQS program while also serving as a point of reference to assist the trainees in acquiring the knowledge and skills they have not achieved on their own.

The PQS begins with a fundamentals section covering the basic knowledge and principles needed to understand the equipment or duties to be studied. This knowledge is normally acquired during the school phase of training. References are listed at the beginning of each fundamentals section for the individual who has not been to school or needs a refresher.

Fundamentals the individual will have to complete are listed in each watchstation (Section 300). The trainee completes all required fundamentals before starting the systems and watchstation portions of the PQS. Individuals contact their qualifiers when their understanding of one or more fundamentals is complete. All line items in the fundamentals section must be satisfactorily answered before the section can be signed off. For individuals who have been to school or are requalifying, the qualifier may ask representative line items to determine if the necessary knowledge for the watchstation has been retained. If the command requires an oral board or written examination for final qualification, any questions from the fundamentals required by the watchstation may be asked.

⁶G. Houston, personal communication, August 7, 1986.

Access Procedures. Job task information is readily available in the standard booklets. Task-by-task qualification data are not retained in a person's service record. The only information retained is whether or not a person is qualified for a watchstation and the date of the decision.

General Remarks

PQS provides information about the basic knowledge and principles in a specified area of qualification. The questions are potentially useful for assessing job performance. However, the use of the existing instrument is not recommended. There are several problems with using PQS examination performance as measures of job performance:

1. The evaluation process is not standardized. Lack of specific evaluation guidelines makes it extremely unlikely that for any given knowledge or skill, different raters will use the same criteria when judging performance. Use of different criteria necessitates a lack of reliability. The system, therefore, does not appear to provide performance information related to individuals and teams that is objective, valid, or reliable.

2. Supervisors differ in how much they emphasize the PQS. Inaccurate data may be collected or records may be poorly maintained. Supervisors are responsible for the accuracy, updating, and tailoring of the PQS to fit their command's needs. As a result, PQS is not standard across commands. Supervisors are also responsible for initiating feedback to the PQS Development Group; therefore, the validity of the system depends partly on the participation of supervisors.

3. The dichotomous nature of the performance scores on PQS tells nothing of the quality of performance. PQS includes no scales by which to indicate how well the trainees answer the questions or perform the tasks. The information collected with the PQS indicates only whether the trainee did or did not achieve the requirements.

4. Differential treatment may be given those trainees who attend "A" school over those who do not. Qualification petty officers may assume that graduates of "A" school are knowledgeable about the material in the fundamentals section and give the graduate credit without formal examination.

5. The rate of qualifying differs widely across commands. Some supervisors push for rapid qualification, while others allow personnel to qualify at a slower pace. Opportunity to complete the PQS may differ by squadron. Squadron's missions vary in complexity and difficulty, affecting the amount of time a trainee can devote to PQS. Rate of qualifying can also be slowed by the availability of the qualification petty officers for assisting trainees in using the reference material and checking off achievements.

The requirements in the standard booklets represent a critical task analysis for a particular watchstation and its associated system and equipment. Fundamentals (Section 100), systems (Section 200), and watchstations/workstations (Section 300) are possible sources for development of performance measures. Each of these sections contains examples of possible performance test questions.

No estimate of the task's importance or criticality to the job is offered. In addition, the standard booklets often do not specify the steps required for task completion. In order to use the information from the standard booklets for test construction, more detailed task analyses must be performed to determine the criticality of tasks and the steps required for task completion.

Fleet Feedback System (FFS)

Information Description

The FFS is operated by the Naval Education and Training Command (NAVEDTRACOM) to provide external evaluation of training programs. It is based on unsolicited reports and on sample surveys that ask about the adequacy of the training in a given course and the importance of this training to the particular ship or activity. A report of the external evaluation findings are forwarded to the commanding officers of the appropriate service school commands for action.

Purposes of the FFS include (1) product evaluation, in order to determine whether or not formal training is effective in the Fleet and responsive to Fleet needs; (2) identification of problems, and (3) support of improvement and contribution to readiness in the Fleet. The program is intended to improve the quality of individual training to assure a beneficial impact in improving overall Fleet readiness without imposing an administrative burden on the Fleet (Office of the Chief of Naval Operations, 1981).

Type of Information. Feedback on training adequacy is solicited and is based on observed performance of graduates, performance in the Fleet setting, and actual performance as compared to course objectives. Feedback regarding the appropriateness of objectives is sought to determine if objectives are responsive to Fleet needs, required or important, and adequate in scope.

The training appraisal and feedback system provides the following methods of training effectiveness feedback to NAVEDTRACOM from commands receiving graduates of specialized skill training courses of instruction:

Level 1: Unsolicited feedback from any source as to the adequacy and effectiveness of training. Training inadequacy reports are available to provide specific and useful feedback from which the need for training program changes may be identified.

Level 2: Feedback provided through questionnaires that are centrally administered by CNET. Questionnaires are organized by training activity and cover the sponsor's training requirements and terminal objectives. Questionnaires employ rating scales and comments. Assessments are made by immediate supervisors on samples of specialized skill training course graduates.

Level 3: Feedback obtained by in-depth analysis of training deficiencies identified through Levels 1 and 2 feedback. Level 3 feedback is used only in cases in which required corrective actions cannot be ascertained from available data. Techniques such as structured interviews are used at this level.

Data Elements. Skills profiles, which comprise the Catalog of Navy Training Courses (CANTRAC), are used to construct Level 2 questionnaires. These are sent to supervisors of training school graduates who compare the objectives with actual job performance. The resulting data are processed by the Course Curriculum Model Manager and statistical analyses are performed. Items are concurrently validated.

Source of Information. Level 2 questionnaires are constructed from skills profiles. All Navy training courses are required to utilize skills profiles unless an external

evaluation system has been incorporated (e.g., construction).⁷ Responses to the questionnaires are inherently subjective because supervisors determine by their own judgment whether or not objectives have been met.

Currency and Maintenance. Level 2 surveys are scheduled every 3 years or on an as-needed basis. Skills profiles are kept current and relevant to Navy training courses through regular, required updating. Schoolhouse needs fluctuate with budgetary constraints that may result in reduced training. Research and development, however, provide ongoing training improvement and efficacy.

Availability

Normal Usage. The FFS's primary functions are to monitor the adequacy of training of graduates, improve instruction and curriculum, adjust objectives, and evaluate cost effective alternatives.

Access Procedures. The skills profiles are readily available on microfiche CANTRAC. Specific objectives and training course material can be assessed by using the Course Identification Number (CIN) found on the Skills Profile. Training course feedback data are not available.

General Remarks

The surveys are essentially customer satisfaction questionnaires and do not assess graduate performance on the job. The degree to which a course meets Chief of Naval Education and Training (CNET) goals is measured. Individual skills profiles are compared to supervisory evaluations for groups of individual participants in a course. This may be considered a measure of transfer of training; it is not a measure of overall job performance. Performance tests are not used at any of the three levels of feedback. Therefore, the surveys do not provide useful information for the JPM program.

Personnel and Training Education Program (PTEP)

Information Description

The PTEP is operated for the Fleet Ballistic Missile Weapon System ratings TC, ET, and missile technician (MT). Its purposes are to:

1. Provide the means to assess the quality of personnel knowledge and skill levels for enlisted personnel.
2. Provide reports to commanding officers and type commanders to assist in planning training and determining the most effective use of personnel.

Type of Information. The PTEP has developed System Achievement Tests (SATs) for the above ratings. The SAT is a criterion-referenced instrument based on test design specifications for the Atlantic and Pacific Fleets derived from Fleet technician (job incumbent) input.

⁷ T. Warwick, personal communication, June 19, 1986.

The PTEP conducts a back-fitted task analysis of current functions during a 1-week workshop. Test design specifications are the single basis for selecting test items for each SAT version. Each specification contains four parts: (1) administration and security, (2) watch qualifications, (3) casualty procedures, and (4) equipment. One set of test design specifications is provided for each supervisor and watchstander technician rating.

Data Elements. Tests built from design specifications contain up to 360 items. Pass/fail criteria for the tests are set at a cut score workshop for areas and subareas. The Fleet provides job incumbents for cut-score workshops where these minimum performance levels are set. Individual and group data are maintained and reported to nuclear-powered Fleet ballistic missile submarine (SSBN) and type commanders.

Source of Information. The test design specifications are the result of a comprehensive task analysis for each rating. Input from job incumbents provides the basis for all SAT construction.

Currency and Maintenance. Routine analyses of examinations are conducted to ensure validity and to correct errors. Tests are replaced every 6 months with an approximate 30 percent change in test items. Forty-eight new tests are generated each year.⁸

Availability

Normal Usage. A self-contained, boxed set of tests, answer sheets, pencils, and a proctor guide are delivered to each submarine about 1 month before sailing. Tests are included for each of the five NEC supervisors and watchstanders. Test security is the same as for Advancement-in-Rate examinations. Each ship also receives a Personnel Data Sheet (PDS) for each crew member including scores on previous SATs, number of patrols, and records of all formal training courses. Individuals update their own PDS and return it to the PTEP along with their test answer sheet. The PTEP maintains records on all strategic weapons systems (SWS) technicians.

A personnel data summary report by ship is produced quarterly. These reports are provided to type commanders, NMPC, and the Strategic Systems Program Office (SSPO). NMPC uses the data to aid in personnel assignments, and type commanders use the data to monitor crews and make equitable assignments. Each ship commander is given an individual scoring report of their crew's performance. A list of available on board training materials is attached to the scoring report.

Access Procedures. Test design specifications and performance data are not available. Only SP-15 has the authority to direct the release of data. Information regarding PTEP may be obtained from SSPO-154, Washington, DC.

General Remarks

SATs are already in use for the FC, ET, and MT ratings.

Although the PTEP has potential for use in the development of job performance measures, the data are not readily available. There are several advantages to the PTEP.

⁸E. Hobson, personal communication, July 10, 1986.

First, the PTEP is based on a thorough task analysis. Second, the PTEP is criteria-based. Standards of performance and criteria are set and performance is measured against these criteria. Third, the PTEP is frequently updated. Tests are revised every 6 months.

The PTEP is limited in to potential use by a small number of ratings. In addition, it does not offer at this time a hands-on job performance test. The PTEP tests may provide, however, a suitable paper-and-pencil substitute for hands-on job performance.

Propulsion Examination Board (PEB)

Information Description

The PEB is a quality-control agency whose final responsibility is certifying that a ship's steam propulsion plant is safe to steam and that the watch teams are qualified. The PEB conducts scheduled ship reviews which involve a Light-Off Exam (LOE) and an Operations/Propulsion Plant Exam (OPPE). The objectives of these exams are to ensure that the material readiness and safety of the propulsion plant is maintained, the level of job knowledge is adequate, and the engineering administrative program is properly conducted.

Type of Information. The PEB uses three methods to determine propulsion plant personnel readiness: written examinations, oral interviews, and watchstander performance. Written tests are generated by computer from a 3,000 question data bank and are primarily used by ships to evaluate level of knowledge and training effectiveness. Oral interviews are used to establish the interviewee's depth of understanding and allow observation of his reaction to situations that test judgment. Watchstander performance is assessed by observing a team's conduct of material safety checks, routine plant evolutions, and casualty control exercises.

Data Elements. The PEB maintains a question bank of 3,000 multiple choice and essay items.⁹ Each question is coded according to (1) type of propulsion plant (600#, 1200#, gas, or diesel), (2) watchstation, and (3) ship type. Computer programs generate tests by selecting questions at random from the question bank according to the appropriate code(s). No two tests are alike. Tests are created for watchstations, not ratings. Ratings most frequently tested, however, are BT and MM. The PEB project officer in charge of an individual ship's test informs the PEB testmaker's of situations unique to that ship so that questions are relevant and pertinent.

Source of Information. Written test questions are composed by SMEs and PEB members. Oral interviews are conducted by an expert examiner. The examiner conducts oral group interviews by asking objective questions determined to be relevant to a given piece of equipment, system, or procedure. Answers are subjectively evaluated, and the group is given a pass or fail rating.

The watch station section (300) of the PQS is the source of tasks to be demonstrated and evaluated during the watchstander task performance phase of the examination. Drill scenarios are based on the Engineering Operations Casualty Control (EOCC).

⁹B. Davis, personal communication, June 23, 1986.

Currency and Maintenance. Twice a year, questions are added to the question pool. The examination coordinator reviews completed test items periodically and may delete items that are consistently missed.

Availability

Normal Usage. An LOE is conducted for any ship spending 120 days or more in the yard. The LOE consists of an evaluation of four major areas: material readiness, level of knowledge, engineering department administration, and fire fighting capability (Department of the Navy, 1986a). OPPEs are scheduled within 6 months after an evolution requiring an LOE. Operational Propulsion Plant Recertification Examination (OPPRE) is scheduled within 6 months after an OPPE and may occur unannounced. OPPEs do not differ from OPPREs except in the way they are scheduled. Type commanders determine test scheduling (Department of the Navy, 1986b).

During a scheduled evaluation, persons in propulsion ratings are evaluated to determine if their job knowledge levels are sufficient. This involves the multiple-choice test and oral interview, both of which are scored as pass or fail. The PEB examiner also observes each watchstation through a number of simulated casualty-control drills. The examiner looks for safety violations, invalid procedures, and loss of plant control. The drill scenarios are based on team performance and are scored satisfactory or unsatisfactory.

A message report provides an overall evaluation of the propulsion plant readiness culminating in either a satisfactory or unsatisfactory rating. Major examination areas are (1) operations (tasks, drills, and evolutions), (2) level of knowledge, (3) fire fighting capability, (4) engineering department administration, and (5) material readiness.

Access Procedures. The PEB will generate ready-made random tests or will tailor-make tests by selecting questions to fit any given requirement. (Contact the PEB, 32nd Street Naval Station, San Diego.)

General Remarks

The task bank contains items that are potentially useful in measuring job performance as a substitute for hands-on tests. The bank is very large, containing approximately 3,000 tasks. There is relatively easy access to the tasks, that is, tests can be generated quickly and may be grouped according to selected performance categories. However, the criticality and representativeness of the items in the task bank have not been determined. This step must be accomplished prior to using the items.

The LOE, OPPRE, and OPPE include hands-on test items. Hands-on test items are also required for JPM. However, the PEB hands-on test items would require major modification for use. The items do not always clearly define the steps for completion; steps would need to be delineated.

The PEB test scores are not useful for job performance measures due to lack of standardization. The scoring procedures vary according to the administrator. Variations in scoring procedures prevent the use of PEB scores for JPM.

TRAINING SIMULATORS

Background

Simulators are used for a wide variety of purposes in the recent development of a simulator data base (M information about the simulators used by different g Information was collected from the following ratings: I base has been developed that contains information abc these ratings.

's Navy. However, prior to Best, & McDaniel, 1985), was not readily available. , RM, FC, and OS. A data simulators used in each of

It may be feasible to use training simulators to measure job performance. Training simulators provide relatively high fidelity at a lower cost than hands-on measures. Training simulator development and job performance measure development strategies employ the same underlying methodology: job task analysis. Although the purposes vary, the process uses much of the same information for formulating training objectives and formulating measures of job performance. This factor leads to consideration of using training simulators as job performance measures.

Importance to the JPM Project

Training simulators vary significantly in hardware, software, output, and fidelity. This section presents an overview of selected simulators. Each simulator is examined for its potential use as a measure of job performance. Simulators with hardware and/or software that can be easily modified can often be adapted for use as job performance measures. The modification of existing simulators offers substantial monetary savings to the developers of performance measures.

Format of Training Simulator Examination and Evaluation

Training simulators examined in this section include:

- A. AC Two Speed Motor Controller Trainer (11E15)
- B. Automated communications emulator (ACE)
- C. Close in weapons system (CIWS) trainer (11G2)
- D. Cutler-Hammer logic controller elevator trainer
- E. Electronic equipment maintenance trainer (EEMT)
- F. Navy tactical data system laboratory (NTDS)
- G. Practical applications laboratory (PRAC DECK)
- H. Small craft electrical system trainer (SMALCRAF)

Each of the above simulators is reviewed as follows:

- 1. Hardware and software
- 2. Output
- 3. Fidelity
 - a. Hands-on
 - b. Cognitive
 - c. Environmental

4. Current Usage
5. Additional Uses

1. Hardware and Software. The hardware that comprises the simulator is cited. In many cases this description includes the device(s) that is emulated. Where applicable, the existing software is described.

2. Output. The output category refers to the output provided by the simulator and output consistently provided by an observer.

3. Fidelity. The fidelity of the simulator is examined. This category is divided into three categories. First, hands-on fidelity is examined (a). Hands-on fidelity refers to the extent of similarity in the physical action required when using a simulator and actual equipment. Second, cognitive fidelity is examined (b). Cognitive fidelity refers to the extent of similarity in the cognitive processes required when using the simulator and actual equipment. Third, environmental fidelity is examined (c). Environmental fidelity refers to the extent of similarity in the simulator environment and the actual equipment environment. All types of fidelity are estimated for each device.

4. Current Usage. Current usage describes for what purpose and by whom the device is used at the present.

5. Additional Uses. The additional uses category contains suggestions for JPM uses of the simulator. This category also contains suggestions for modifications that would enhance the value of the simulator as a performance measurement tool.

AC Two Speed Motor Controller Trainer (11E15)

The 11E15 device was designed to assist in teaching troubleshooting of motor controllers.

Hardware and Software

The device is a three-dimensional unit. It simulates an AC motor, motor controller, multimeter, megger, and test leads. The simulator components include a control panel, computer, and power supply. Software has been developed to represent 29 faults. The software may be used for practice or testing. The practice mode presents faults randomly. In the test mode, the rater selects faults that the trainee must locate. Actual test equipment is not used; measurements made with test equipment are simulated.

Output

The software is designed to record the number of incorrect responses.

Fidelity

The hands-on fidelity of the motor controller is moderately high. The equipment is similar; however, access may be more difficult in the Fleet.

The cognitive fidelity of the motor controller is high. The required knowledge and cognitive processes related to troubleshooting procedures are similar when using the simulator and in the Fleet.

The environmental fidelity of the motor controller is moderate. In the Fleet, the equipment is located in smaller quarters. Also, the noise and motion are greater in the Fleet.

Current Usage

The trainer is currently available for use in training of EMs, but it is not an integral part of training for all EMs.

Additional Uses

The trainer can be used for testing the job performance of EMs at the E4, E5, and E6 levels. In order to be tested on the trainer, the EM would need Fleet experience with motor controllers and a brief lesson in using the trainer. The trainer was designed as a generic device. Software could be developed and/or modified to measure performance on any motor controller.

Automated Communications Emulator (ACE)

ACE is designed to simulate the functions of an LDMX/NAVCOMPARS computer. ACE allows a user to access data files and to perform LDMX/NAVCOMPARS inrouter, router and service clerk duties.

Hardware and Software

The equipment used in the ACE includes a Zenith 120 desktop computer, a Winchester hard disc drive, floppy disc drive, keyboard, cathode ray terminal (CRT), and printer. Software programs allow the use of two modes. First, a review and progress evaluation mode consists of the operating system, utility programs, application programs, data file sets, and menus. From the menu, users choose a section for review. Following the review period, the evaluator accesses the progress evaluation phase. The user's knowledge is then tested. Second, the emulation mode consists of message center, service center, and LDMX/NAVCOMPARS operation scenarios.

Output

The device is not programmed to record user performance.

Fidelity

Hands-on fidelity is very high. The ACE is considered identical to Fleet equipment except for printer differences.

Cognitive fidelity is also very high. The knowledge required to perform functions is identical except for printer operations.

The environmental fidelity is considered to be as high as possible. According to SMEs, there are no perceivable differences between the ACE and Fleet environment.

Current Usage

The ACE is used for training RMs.

Additional Uses

Software modifications would allow the ACE to be used to measure RM job performance on many router, inrouter and service clerk tasks. Software modifications would be necessary to ensure inclusion of representative problems and the recording of performance. The device and existing software programs are applicable to RMs. Extensive software development would be required for use with other ratings.

Close in Weapons System Trainer (11G2)

The 11G2 is a three-dimensional training device used by FCs. It is programmed to teach troubleshooting and maintenance checking of the CIWS.

Hardware and Software

The appearance and operation of the 11G2 are similar to the MK-15 Phalanx CIWS. The 11G2 is computer-controlled using software programs. Programs allow a user to isolate and repair various faults and perform maintenance checks in the electronic and hydraulic system. The 11G2 consists of panels with partial views of all portions of the CIWS, excluding the gun. Users are provided with information about a problem or maintenance check. The user then selects a portion of the system to view. This section appears on a panel. The user may use test equipment and continue in the process until reaching the lowest possible unit.

Output

The 11G2 automatically logs the equipment conditions, user responses, and time for problem completion for each exercise.

Fidelity

The 11G2 is moderate in hands-on fidelity. In some instances, repairs of the 11G2 require less manual dexterity than repairs of the actual equipment.

Cognitive fidelity is very high. There are few or no differences in the knowledge required when working with the 11G2 and the CIWS.

Environmental fidelity is relatively low. The environment of the 11G2 is very stable and sanitized as compared to the CIWS. The CIWS includes the positioning of the system in cramped quarters, the pitching motion of the ship, and additional safety considerations.

Current Usage

The 11G2 is used by FCs as a training component. All students are exposed to this device.

Additional Uses

The 11G2 was designed as a specific trainer. All aspects of the system, including appearance, are based on the MK-15 Phalanx CIWS. The 11G2 can be utilized for measurement of job performance on this CIWS. It would be difficult to adapt the equipment for performance measurement of other devices.

Cutler-Hammer Logic Controller Elevator Trainer

The Cutler-Hammer logic controller elevator trainer is designed to simulate faults in a logic controller. It teaches troubleshooting to the lowest possible component.

Hardware and Software

The device consists of several items mounted on a table. These items include a problem simulator, a flat car containing the remote devices found in actual elevators, and a logic controller. The trainer is used in the following manner. The rater inserts one or more faults. The trainee uses schematics and test equipment to troubleshoot the equipment. The task is completed when the trainee locates the fault(s).

Output

Information is not recorded by the elevator trainer. The rater records the number of errors and time for completion on a standardized checklist.

Fidelity

The hands-on fidelity is low. The trainer represents outdated equipment; many factors have changed. The trainer simulates fewer levels than are actually required in practice.

The cognitive fidelity is moderately high. The cognitive processes required to troubleshoot the trainer are similar to the processes required to troubleshoot in the Fleet. However, faults that are important in the Fleet are not represented on the trainer.

The environmental fidelity is low. First, the trainer places the logic console and elevator in close proximity. In the Fleet, the logic console and elevator are not located in the same area; thus, repairs are more difficult. Second, the trainer allows easy access to equipment. Access is much more difficult on board ship.

Current Usage

The elevator trainer is designed for use by EMs for training; however, its current use is very limited.

Additional Uses

The Cutler-Hammer logic controller elevator trainer is designed for a very specific purpose, troubleshooting faults in logic controllers. The trainer is also designed for a very specific group, EMs with extensive Fleet experience and training in the use of the device. The device could be updated for use in measuring job performance for troubleshooting logic controllers. Due to the specificity of the devices, it serves an extremely limited population.

Electronic Equipment Maintenance Trainer (EEMT)

The EEMT is a training simulator used for teaching maintenance procedures and troubleshooting tasks on electronics equipment.

Hardware and Software

The EEMT consists of a microcomputer, video display with touch sensitive panels, and a videodisc player. It is a two-dimensional device. Software programs have been created for use with the unit. Structured and free play problems are included. A structured program provides a lesson using a directive interactive format. Free play programs allow the trainee to follow many different paths in solving the problem. Each program contains a series of problems associated with a specific piece of electronics equipment. Menus, text, problems, and equipment images (from a photographic data base) are presented on the video display. Trainees interact with the unit by hitting a touch panel on the video display.

Output

The number of correct and incorrect responses are automatically recorded.

Fidelity

The EEMT is relatively low in hands-on fidelity. There is little similarity between the physical characteristics of the EEMT and the actual equipment.

The cognitive fidelity is high. The cognitive processes required for simulated repair and maintenance of equipment are similar to the processes when repairing actual equipment.

The environmental fidelity is low. The EEMTs are housed in a relatively comfortable environment; factors such as noise, crowding, and motion are not included in the classroom.

Current Usage

At this time, the EEMT is used by two ratings, ETs and FCs. ETs use the EEMT for remediation; it is not currently part of the core curriculum. Data bases have been developed for several types of electronic equipment. FCs use the EEMT as an integral aspect of their training program. The EEMT provides FCs with training for troubleshooting on the 11D8A Radar Trainer. First termers are the primary users of the device.

Additional Uses

The EEMT is a generic trainer that can be used for performance testing. Software can be developed for training and/or testing on most pieces of equipment. Software may also be modified to provide more job performance data. The EEMT is user friendly; it is very easy to learn to use the simulator.

Navy Tactical Data System Laboratory (NTDS)

The NTDS laboratory simulates an operational NTDS. The laboratory is designed to train personnel to access and enter data, as required for tactical maneuvers.

Hardware and Software

The NTDS laboratory is a three-dimensional trainer that provides high-fidelity simulations. It includes the consoles used in the Fleet and data entry panels that are

similar to those used in the Fleet. The software contains scenarios that are representative of situations that occur in the Fleet.

Output

Performance is automatically measured by the simulator. All nonverbal responses can be recorded; however, a limited output is currently received.

Fidelity

The hands-on fidelity is high. The equipment is identical to the equipment used in the Fleet.

The cognitive fidelity is high. The cognitive processes required to operate the training equipment and actual equipment are identical.

The environmental fidelity is high. The laboratory is designed to be similar to actual surroundings. The motion of the ship is absent in the laboratory.

Current Usage

The laboratory is an integral part of training for NTDS.

Additional Uses

The NTDS laboratory may be used to measure job performance of OSs. The laboratory includes various sensors, processor consoles, and tactical programs. SMEs estimate that the lab covers approximately 25 percent of an OS's job tasks. The laboratory could effectively measure these tasks and similar tasks for any rating. Extensive hardware and software changes would be required to include other tasks.

Practical Applications Laboratory (PRAC DECK)

The PRAC DECK laboratory simulates afloat and ashore communications centers. The PRAC DECK contains equipment used to transmit and receive messages. The equipment is similar to the equipment found in a Fleet radio shack.

Hardware and Software

The PRAC DECK contains nearly identical equipment to that found in a Fleet radio shack. The equipment may be a generation older; however, it is functionally similar. Specifically, the PRAC DECK contains the following:

- AN/WRC-1, HF transmitter
- AN/URT-23V, HF transmitter
- R-1051, HF receiver
- AN/URC-9, UHF transceiver
- AN/UGC-6, teletypewriter (send)
- AN/UGC-25A, teletypewriter (receive)
- KWR-37/TSEC, cryptographic equipment
- KG-14/TSEC, cryptographic equipment
- KW-7/TSEC, cryptographic equipment
- KY-75/TSEC, cryptographic equipment

KY-8/TSEC, cryptographic equipment
KY-58/TSEC, cryptographic equipment
KWX-8/TSEC, cryptographic remote phasing unit
SB-988/SRT, transmitter transfer switchboard
AN/URA-17, converter/comparator group
CV2460/SCG, telegraph-telephone signal converter
AN/SRA-12-3/UG, patch panel
SB973/SRR, patch panel
SB863/SRT, patch panel
SB1203/UG, patch panel
SB1210/UGQ, patch panel
SB-3195, patch panel
C10315, remote switching control matrix
C1004B, transmitter-teletypewriter control
TA-970/U, secure phone

Output

The PRAC DECK includes operational equipment fed into dummy loads. The primary form of output is a hard copy of the message that is sent or received. The messages may be checked for accuracy. In addition, human raters monitor the rates performance.

Fidelity

The hands-on fidelity is very high. It is less than perfect because some pieces of equipment are not the most current models.

The cognitive fidelity is very high. The knowledge required to function in a PRAC DECK is almost identical to the knowledge required to function in an afloat or ashore communications center.

The environmental fidelity is moderate. The PRAC DECK is more spacious than some centers. It is also free of static, which is a problem in centers.

Current Usage

The PRAC DECK is used for training of RMs. It provides a working environment for performing nine RM job positions.

Additional Uses

The PRAC DECK is a highly specialized environment. It can be used to measure the performance of RM. However, the essence of the PRAC DECK allows it to be used only by ratings that are familiar with communications equipment. Users of the PRAC DECK are required to possess a security clearance.

Small Craft Electrical System Trainer (11E18)

The 11E18 simulates the operation of a small craft electrical system. This device is designed to teach troubleshooting to EMs by presenting faults in several pieces of equipment.

Hardware and Software

The 11E18 resembles a work bench on which equipment is mounted. The unit is based on a control panel attached to a computer and power supply. The components on the bench include a starter, an alternator, a battery, a regulator, and a lighting system. The software consists of fixed programs that allow the user to isolate and repair one or more of the 12 possible faults. The trainer selects the fault(s) to be used and then the user troubleshoots by accessing information and determining the required repair. The user enters a repair choice on the keyboard; lights flash to indicate a correct or an incorrect choice.

Output

Correct and incorrect choices are recorded cumulatively and by percentage.

Fidelity

The hands-on fidelity is low. The 11E18 is organized quite differently than a ship is organized. In addition, standard Fleet troubleshooting equipment cannot be used on the simulator due to its design.

The cognitive fidelity is low. The programmed faults are not representative of the faults found on ships. SMEs considered 5 of the 12 faults to be too simplistic.

The environmental fidelity is low. The Fleet environment contains many elements that are not present in the 11E18, such as motion and difficult access to equipment.

Current Usage

The 11E18 is currently used as a trainer for EMs. Individuals can be trained to use the machine in approximately 1 to 3 hours.

Additional Uses

The device could be used to measure job performance; however, several changes would first need to be made. There is a need for increased machine reliability; several faults were not available. The relevant faults could be added. Different or additional equipment could be included on the work bench to fit the population in question.

RECOMMENDATIONS

The Navy currently holds a great deal of information that is pertinent to JPM. Although no existing data bases, programs, or simulators can be used as complete performance measures, each of these systems may support the development of job performance measures.

Data Bases

NOTAP provides a comprehensive data base consisting of task lists, encompassing approximately two-thirds of all Navy ratings. These data are collected in a questionnaire format. It is recommended that the NOTAP data be used as a starting point in the development of job performance measures. The NOTAP questionnaires could be used for

gathering SMEs' judgments on tasks to include in a JPM program. SMEs could be asked to rate the criticality of tasks on the NOTAP questionnaire. These criticality ratings could then be used to select tasks for performance measurement. NEPDIS is limited in use because it has been completed for only one rating and has not been maintained.

Programs

The PQS system is designed to provide standardized information regarding the knowledge and duties associated with each watchstation. Each PQS refers to a particular watchstation; approximately 700 PQS have been developed. PQS may be useful in formulating job performance measures. Each PQS booklet is the result of a task analysis for a particular watchstation. The results of the task analysis are presented in question and answer format. It is difficult to use PQS because the majority of items do not include the steps for task completion; however, some of these items may be translated into performance test questions. The results of PQS are not useful for job performance testing due to scoring procedures. PQS is scored by a variety of supervisors who may vary in testing style and interpretation of performance. It is recommended that PQS be used as a developmental tool in the job performance test construction phase. SPPOT uses EOSS and PQS for development of job performance and hands-on items. The utilization of technical information, such as EOSS, may prove to be beneficial in the construction of performance tests.

The FFS provides an evaluation of Navy training programs. This system offers valuable information to the designers and trainers; it does not provide job performance information. The system offers training course information; it does not offer job performance information. However, the JPM program may benefit from a strategy used by this system; that is, JPM can also use the Catalog of Navy Training Courses to gather technical information. In addition, the JPM program can assist the FFS. JPM acquires data that are equivalent to the FFS's Level 3 data. Level 3 data can be used by the FFS's group to confirm the Level 2 data.

The PTEP is a method of evaluating training in specified ratings. The program is advantageous due to its rigorous development. A thorough task analysis is conducted and updated, and all tests are criterion-referenced. PTEP may be of limited use to a job performance program due to its limited scope and high security. PTEP has been developed for only five ratings. SP-15 must authorize all use of PTEP materials. The security of PTEP makes it difficult to consider for use in the development job performance measures.

The PEB evaluates the safety of a ship's steam propulsion plant and the readiness of the watch teams. The task bank of PEB contains a large number of items that can be useful in developing performance measures. The task bank items may serve as a basis for gathering SME judgments regarding the representativeness and criticality of potential paper-and-pencil test items. In a similar manner, PEB hands-on items may also be used as a basis for development of hands-on job performance measures.

Simulators

Simulators may be used as substitute measures of hands-on job performance. One device, the small craft electrical trainer, can be eliminated from consideration because extensive, costly modifications would be required.

Several devices have been developed for use with a single rating. For example, the AC two-speed motor controller trainer and the Cutler-Hammer logic controller elevator trainer are designed for use by the EMs. The ACE is designed for use by the RM rating. The CIWS trainer is designed for use by FCs. With hardware and/or software modifications, each of these devices could be used for performance measurement of the rating for which it was designed. However, extensive hardware and software modifications would be required for use with any other rating.

Two devices are full mock-ups: the PRAC DECK and the NTDS laboratory. Each contains many pieces of actual equipment, resulting in very high fidelity for the PRAC DECK and NTDS. The PRAC DECK can be considered as a measure of job performance for ratings that work with communications equipment, specifically the RM rating. Use of the PRAC DECK is limited for three reasons: (1) a security clearance is required, (2) this device is used extensively at this time; and (3) some equipment must be modified to provide performance data. If these three obstacles can be overcome, the PRAC DECK is potentially an excellent source of job performance data. NTDS is also recommended for use. This laboratory contains actual equipment and identical replicas of actual equipment. Software has been developed to provide scenarios that are representative to those occurring in the Fleet. Although the NTDS laboratory has the capability to record a great deal of information regarding user performance, the software would need to be modified to record meaningful performance data. NTDS is also a potentially good source of job performance data for OSs.

One device with the most potential as a substitute measure of job performance is the EEMT. The EEMT was originally developed as a generic trainer. This device is currently used by two ratings, ETs and FCs, and could be modified to accommodate a great number of ratings. The EEMT can be modified with relative ease to test troubleshooting and maintenance tasks on equipment. It is recommended that the EEMT be used as a substitute measure of hands-on job performance.

CONCLUSIONS

The use of data bases, programs, and/or simulators for more than one purpose avoids duplication of effort, thus reducing cost and time. If the JPM program is expanded beyond the six ratings currently being covered, analyses of additional data bases, programs, and simulators should be conducted to form a board network of job performance information for use by many groups.

REFERENCES

- Ansbro, T. M. (1982). An overview of the naval enlisted professional development information system (NEPDIS) (Tech. Rep. 122). Orlando, FL: Training Analysis and Evaluation Group.
- Department of the Navy. (1975, September). Manual of Navy enlisted manpower and personnel classifications and occupational standards: Section I Navy enlisted occupational standards (NAVPER 18068D). Washington, DC: Author.
- Department of the Navy. (1986a, April). Propulsion plant examining procedures for light-off examinations (LOEs) (CINCPACFLTPEBINST 3540.2A). San Diego, CA: Author.
- Department of the Navy. (1986b, April). Propulsion plant examining procedures for Operational Propulsion Plant Examinations (OPPES) and Operational Propulsion Plant Recertification Examinations (OPPRES) (CINCPACFLTPEBINST 3540.3). San Diego, CA: Author.
- Laabs, G. J., & Berry, V. M (in press). The Navy job performance measurement program: Background and inception. San Diego, CA: Navy Personnel Research and Development Center.
- Main, R. E., Abrams, M. L., Chiles, C. R., Todd, J. L., & Cunanan, B. (1981, October). Tailoring shipboard training to fleet performance needs: III. Development of deckplate procedural training for the Shipboard Propulsion Plant Operator Training (SPPOT) Program (NPRDC Tech. Rep. 82-6). San Diego, DA: Navy Personnel Research and Development Center.
- Morris, C. L., Best, B. J., & McDaniel, W. C. (1985). Simulator/device based performance measurement (Spec. Rep. 85-002). Orlando: Training Analysis and Evaluation Group.
- Office of Chief of Naval Operations. (1981, August). Training Appraisal Program (OPNAVINST 1540.50A). Washington, DC: Author.
- Office of Naval Education and Training. (1986, June). Personnel Qualification Standard Management Guide (NAVEDTRA 43100-1C). San Diego, CA: Author.
- Robertson, D. W. (1984, June). Navy enlisted occupational classification system (NEOCS): Assessment. (NPRDC Tech. Rep. 84-44). San Diego, CA: Navy Personnel Research and Development Center.

END

8-87

DTIC